

IN THE CLAIMS:

Cancel claims 1 to 59, without prejudice.

This listing of claims will replace all prior versions and listings of claims in the application:

1. to 59. (currently withdrawn)

60. (new) A method for making a web of paper or board comprising:

forming a web from fibers; and

treating a surface of the web with a treatment material comprising pigment particles having an average size in the range of 0.5 to 100 nm.

61. (new) The method of claim 60, wherein the pigment particles have an average size in the range of 15 to 25 nm.

62. (new) The method of claim 60, wherein the web is treated with pigment particles that have an average size sufficiently small to bind the particles together at least by van der Waals forces.

63. (new) The method of claim 60, wherein the web is treated with calcium carbonate particles (CaCO₃).

64. (new) The method of claim 63, wherein the web is treated with particles comprised of single elementary particles.

65. (new) The method of claim 63, wherein the web is treated with flocced particles comprised of elementary particles.

66. (new) The method of claim 60, wherein the web is treated with flocced particles having an average size not larger than 500 nm.

67. (new) The method of claim 65, wherein the treating step comprises creating a turbulent flow of the flocced particles, and wherein a size of the flocced particles is controlled by regulating a degree of turbulence in the turbulent flow.

68. (new) The method of claim 66, wherein the treating step comprises creating a turbulent flow of the flocced particles, and wherein a size of the flocced particles is controlled by regulating a degree of turbulence in the turbulent flow.

69. (new) The method of claim 65, wherein that a size of the flocced particles is controlled by adjusting the pH level of the particle surroundings.

70. (new) The method of claim 66, wherein that a size of the flocced particles is controlled by adjusting the pH level of the particle surroundings.

71. (new) The method of claim 60, wherein said treating step comprises treating the web with slaked lime (CaO), reacting the slaked lime on the web with water to form calcium hydroxide (Ca(OH)₂), and reacting the calcium hydroxide on the web with carbon dioxide (CO₂) to form calcium carbonate particles (CaCO₃).

72. (new) The method of claim 60, wherein said treating step comprises treating the web with calcium hydroxide (Ca(OH)₂) and then reacting the calcium hydroxide on the web with carbon dioxide (CO₂) to form calcium carbonate particles (CaCO₃).

73. (new) The method of claim 60, wherein a solids content of the treatment material is at least 80 %.

74. (new) The method of claim 60, further comprising, before said treatment step, applying one of alum, and polymer to the web.

75. (new) The method of claim 60, further comprising, before said treatment step, treating the web with one of an electrolytic and corona discharge treatment.

76. (new) The method of claim 60, further comprising, after said treatment step, applying electromagnetic radiation to the web.

77. (new) The method of claim 76, wherein the electromagnetic radiation applied comprises at least one of infrared, ultraviolet, radioactive, x-ray and microwave radiation.

78. (new) The method claim 60, further comprising, before said treatment step, one of mechanical and thermomechanical treatment to promote adherence of the particles to the web surface.

79. (new) The method of claim 78, wherein the mechanical treatment comprises brushing the web to elevate microfibrils of web fiber walls up from the surface of the web.

80. (new) The method of claim 79, wherein material used to brush the web is selected so that the brushed surface of the web is charged with static electricity.

81. (new) The method claim 60, further comprising calendering the web after the particle treatment step.

82. (new) The method of claim 71, further comprising calendering the web before the calcium carbonate particles are crystallized from an amorphous state.

83. (new) The method of claim 72, further comprising calendering the web before the calcium carbonate particles are crystallized from an amorphous state.

84. (new) The method of claim 82, wherein at least one heated calender roll is used to calender the web.

85. (new) The method of claim 83, wherein at least one heated calender roll is used to calender the web.

86. (new) The method of claim 82, further comprising, before calendering, treating the web with a treatment material.

87. (new) The method of claim 83, further comprising, before calendering, treating the web with a treatment material.

88. (new) A method for forming a paper, board or plant-fiber-based web, comprising:
spreading onto a surface of a moving web-formation substrate raw material comprising at least one of the group consisting of cellulosic fiber, plant fiber and other material suitable for manufacturing a paper, a board or a nonwoven product;

passing the raw material on the web-formation substrate through at least one compressive nip to form a web from fibers in the raw material;

bringing the web-formation substrate to a first electric potential;

applying a second electric potential higher than said first electric potential and displaced from said first electric potential at a distance above the surface of the web-formation substrate onto which the raw material has been spread so that an electric field is established between said first and second electric potentials;

adjusting a voltage between the first and second electric potentials so that the voltage is sufficient to establish a corona discharge between points where the first and second electric potentials are applied, the corona discharge being capable of causing an ion blast from the second electric potential to the first electric potential so as to transport particulate raw material between the first and second electric potentials onto the web-formation substrate and assure adherence of the raw material to the web-formation substrate; and

treating the web with elementary pigment particles having an average size in the range of 0.5 to 100 nm.

89. (new) The method of claim 88, wherein the elementary pigment particles have an average size in the range of 15 to 25 nm.

90. (new) The method of claim 88, wherein the elementary pigment particles are added to the web at least during the spreading step, whereby the particles form interfiber bonds at least by van der Waals forces.

91. (new) The method of claim 88, wherein the elementary pigment particles are added to the surface of the formed web.

92. (new) The method of claim 90, wherein the elementary pigment particles are added to the surface of the formed web.

93. (new) The method of claim 91, wherein the elementary pigment particles are added to the surface of the formed web by means of an ion-blast technique.

94. (new) The method of claim 92, wherein the elementary pigment particles are added to the surface of the formed web by means of an ion-blast technique.

95. (new) The method of claim 88, wherein the web is treated by applying the particles to the web surface by first treating the web with slaked lime (CaO), then reacting the slaked lime with water to form calcium hydroxide (Ca(OH)₂), and then reacting the calcium hydroxide with carbon dioxide (CO₂), whereby calcium carbonate particles (CaCO₃) are formed.

96. (new) The method of claim 88, wherein the web is treated by applying the particles to the web surface by first treating the web with calcium hydroxide (Ca(OH)₂), and then reacting the calcium hydroxide with carbon dioxide (CO₂), whereby calcium carbonate particles (CaCO₃) are formed.

97. (new) The method of claim 88, further comprising, prior to the application of the particles, treating the web by alum, polymer, electrolytic or corona discharge treatment and wherein the particles of the web treatment material are adhered to the web surface.

98. (new) The method of claim 88, further comprising augmenting adherence of the particles of the web treatment material to the web surface by electromagnetic radiation treatment.

99. (new) The method of claim 98, wherein the electromagnetic radiation treatment employs infrared, ultraviolet, radioactive, x-ray or microwave radiation.

100. (new) The method of claim 88, further comprising augmenting adherence of the particles of the web treatment material to the web surface by mechanical or thermomechanical treatment.

101. (new) The method of claim 100, wherein the web is brushed to elevate microfibrils of the web fiber walls up from the web surface.

102. (new) The method of claim 101, wherein the web is brushed with a brush material selected so that the surface of the web after brushing is charged with static electricity of negative or positive polarity as desired.

103. (new) The method of claim 88, further comprising calendering the web after the particle treatment step.

104. (new) The method of claim 103, wherein the web is calendered prior to crystallization of the calcium carbonate particles from their amorphous state.

105. (new) The method of claim 104, wherein the web is calendered with at least one calender rolls that is heated.

106. (new) The method of claim 104, wherein the web is treated with a treatment material prior to calendering.

107. (new) The method of claim 88, wherein the web is treated with recycled calcium carbonate obtained from precipitated calcium carbonate residue of the deinking process of recycled fiber.

108. (new) The method of claim 107, wherein the calcium carbonate is prepared by calcining calcium-carbonate-containing precipitate into lime, reacting the lime with water and reacting the calcium hydroxide thus formed with carbon dioxide in a turbulent gas phase, whereby fine particulate calcium carbonate is formed.